Call for FY 2006 Capability Applications Projects (CAP) Proposals

As a consequence of this year's High Performance Computing (HPC) Modernization Program (HPCMP) hardware technology insertion process (TI-06), the program will acquire several new HPC systems with 2,000 to 4,000 processors and three to nine terabytes of memory. These large TI-06 systems that will be available for Capability Applications Projects include an approximately 4,000 processor Linux Networx Xeon cluster system at the U.S. Army Research Laboratory (ARL) Major Shared Resource Center (MSRC) supporting unclassified processing, an approximately 3,000 processor Linux Networx Xeon cluster system at ARL supporting classified processing, an approximately 3,000 processor IBM Power 5 system at the Naval Oceanographic Office (NAVO) MSRC supporting unclassified processing, and an approximately 2,000 processor IBM Power 5 system at NAVO supporting classified processing. These four systems are expected to be available for pioneer usage in the July to September 2006 time period. After acceptance testing, the HPCMP will make these systems available for Capability Applications Projects, during which selected computational projects may test their application codes on a substantial portion of the entire system and solve large, meaningful problems in a relatively short time. It is anticipated that these HPC resources will be available for approximately two months for this important activity before they begin operation under the program's standard allocation policies.

The general concept of capability computing is endorsed by the program's three main advisory bodies: the HPC Advisory Panel (HPCAP), the Computational Technology Area Advisory Panel (CTAAP), and the User Advocacy Group (UAG). The goals of this activity are to:

1. quantify the degree to which important application codes scale to thousands of processors, and
2. enable new science and technology by applying these codes in dedicated, high-end, capability environments.

The process to enable this activity must continue to be neither overly burdensome nor bureaucratic and sufficiently flexible to deal with potential system delivery and acceptance slippages, less than 100% reliable hardware, and the challenges of integrating new state-of-the-art HPC systems into existing MSRCs. Even though it is an extension of pioneer usage of new HPC systems, this activity focuses much more heavily on true capability use.

Proposers who have experience running an application code on reasonably large numbers of processors or large amounts of memory, would like the opportunity to test the application code on significantly more capable systems with more memory and larger numbers of processors, and would like to perform leading-edge science and technology are invited to participate in this opportunity. To apply for participation, proposers should prepare a short proposal (no more than four pages) containing the following:

- Project leader's name and contact information
- HPC project number and past or present Challenge, Capability Applications Project, or application code development project title and number
- Name of your application code

- Which of the new system(s) to be used

- A brief discussion of the:
  - Application code's history to include:
    - scalability of the code
    - the largest number of processors and/or the largest amount of memory on which it has successfully run
    - the types of system(s) on which this code is known to execute
    - the typical duration (either one number or a range) in hours of a typical run using the largest number of processors on which the code has run
  - Estimated CAP usage to include:
    - the estimated amount of time (calendar time) to prepare for production runs (with intermittent access to the system for testing)
    - the length of time in hours that a typical production run would last
    - the fraction of the system on which testing the scalability of the application is proposed (10-100%), either in terms of numbers of processors or amount of memory, or both
    - what fraction of the system on which running production work is proposed (10-100%), either in terms of numbers of processors or amount of memory, or both
    - the total number of CPU hours proposed for the production phase of this project
  - Names of the candidate users who will be executing this activity
  - Project's impact to include: a brief description of what new results could be obtained with this code if access is provided to a large fraction of one of the new systems for a small number of production runs.

The program office and the participating MSRCs, as sponsors, will select approximately ten to twenty candidate projects from these requests and give each an opportunity to have a large fraction of the new HPC systems dedicated to it for a period of time sufficient to test the code's ability to execute on that large fraction of the system and to obtain timing data to measure scalability and parallel efficiency. Some codes may fail their initial testing because of code or machine inadequacies. If this happens, the sponsors will attempt to arrange an opportunity for additional trials after a brief period to address the problems.

After this initial test period, the sponsors (program office and participating MSRCs) will select a subset of successfully tested codes and projects to have dedicated access to substantial fractions of the new systems for production work designed to solve a large, significant problem, based on documentation provided by each project leader. Depending on the number of Capability Applications Projects selected for this production work, the period of time dedicated to this capability workload could last from one to three months.

The HPC systems to be used for this activity are expected to be delivered sometimes between June and September. Allowing suitable time for acceptance testing and general system check-out, we anticipate that these Capability Applications Projects may begin during a time period

from July through October, with all projects completed on all systems by 31 December 2006. The goal is to complete all CAP work by 30 September 2006.

Proposals are to be submitted directly to the HPCMPO by **24 March 2006**. The HPCMPO requires proposals in Microsoft Word 95 or later format by email. Please e-mail the completed proposal to the point-of-contact for Capability Applications Projects at the DoD HPC Modernization Program Office, Dr. Larry P. Davis, Deputy Director (require@hpcmo.hpc.mil). Any questions should be directed to Dr. Davis at this e-mail address or by telephone at 703-812-8205.